(b) a plurality of directional sector antennas each directionally oriented to a predetermined geographic area and each being adapted for the transmission and reception of electromagnetic energy at a millimeter wave frequency; and

(c) a processor including a CPU and a modem responsive to said CPU, said processor:

(i) determining the routing of bursty data received from the computer network to one or more of said plurality of sector antennas;

(ii) sensing one or more parameters of the radio communication link between said hub and each node to which bursty data is to be communicated;

(iii) dynamically varying at least one of (1) the power at which the communication is transmitted or (2) the data density of the communication between said hub and a node as a function of one or more of the sensed parameters; and

(iv) providing signals for synchronizing the periods of transmission and reception by said at least one node with the periods of transmission and reception by said hub; and

a plurality of nodes each geographically spaced from said hub and adapted to be operatively connected to a computer network other than the computer network to which said hub is adapted to be connected for the communication of bursty data between the

node and the computer network to which connected, each of said plurality of nodes having:

(a) a transceiver for the transmission and reception of electromagnetic energy at a millimeter wave frequency;

(b) a highly directional antenna directionally oriented toward said hub, said antenna being adapted for the transmission and reception of electromagnetic energy at a millimeter wave frequency; and

(c) a processor including a CPU and a modem responsive to said CPU, said processor varying the ratio of the periods of transmission and reception of bursty data by said node antenna as a function of signals provided by the processor at said hub.

39. The system of Claim 38 wherein said routing of bursty data received from the computer network at the hub to one or more of said plurality of sector antennas is determined as a function of the content of the received bursty data.

40. The system of Claim 38 wherein the bursty data received by said hub from the computer network and from said at least one antenna includes an address; and

wherein said hub processor is responsive to said address for routing the bursty data from the computer network to said at least one antenna.

41. The system of Claim 38 wherein the frequency of said millimeter wave electromagnetic energy is between about 20 GHz to about 43 GHz.

42. The system of Claim 38 wherein said processor includes a buffer and means for varying the data density of the bursty data transmitted by said at least one antenna.

43. The system of Claim 42 wherein said means for varying the data density varies said data density as a function of (1) the distance between said hub and each of said nodes or (2) one or more of the sensed parameters.

44. The system of Claim 42 wherein the bursty data is divided into time slots; and wherein the data density of the bursty data transmitted is independently variable for each time slot.

45. The system of Claim 38 wherein said hub processor includes a buffer and means for varying the data density of the bursty data transmitted by said at least one antenna as a function of the node to which the selected antenna is directed and thus the distance of said node from said hub.

46. The system of Claim 38 wherein said at least one hub antenna has a beam width of about 16 degrees in azimuth.

47. The system of Claim 38 wherein said at least one hub antenna has a beam width of not less than about 16 degrees in azimuth.

48. The system of Claim 38 wherein each of said node antennas has a beam width of about 2 degrees in both azimuth and elevation.

49. The system of Claim 38 wherein each of said node antennas is a dish antenna.

50. The system of Claim 38 wherein said hub antenna has a beam width of not less than about 16 degrees and wherein each of said node antennas has a beam width of about 2 degrees.

51. The system of Claim 38 wherein said at least one hub antenna has a beam width of not less than about 8 times the beam width of each of said node antennas.

52. The system of Claim 38 wherein a communication parameter is the ratio of the bandwidth requirement of each one said nodes relative to the bandwidth requirements of the entire system.

53. The system of Claim 38 wherein each of said transceivers each have a bandwidth of about 10 MHz.

54. The system of Claim 38 wherein each of said transceivers each have a bandwidth of at least about 10 MHz.

55. A point-to-multipoint adaptive time division duplex communication system for the short distance radio communication of bursty data from one computer network to another computer network comprising:

a hub geographically located in a predetermined location and adapted to be operatively connected to a computer network for the communication of bursty data between the computer network and the hub, said hub having:

(a) at least one transceiver for the transmission and reception of electromagnetic energy at a millimeter wave frequency,

(b) at least one directional antenna directionally oriented to a predetermined geographic area and adapted for the transmission and reception of electromagnetic energy at a millimeter wave frequency, and

(c) a processor including a CPU and a modem responsive to said CPU, said processor:

(i) determining the routing of bursty data received from the computer network to which connected to selected ones of said at least one antenna;

(ii) varying the ratio of the periods of transmission and reception of bursty data by said at least one antenna at said hub, and

(iii) providing signals for synchronizing the periods of transmission and reception by each of the nodes with the periods of transmission and reception by said hub; and

a plurality of nodes each geographically spaced from said hub and adapted to be operatively connected to a computer network other than the computer network to which said hub is adapted to be connected for the communication of bursty data between the node and the computer network to which connected, each of said plurality of nodes having:

(a) a transceiver for the transmission and reception of electromagnetic energy at a millimeter wave frequency,

(b) a highly directional antenna directionally oriented toward said hub, said antenna being adapted for the transmission and reception of electromagnetic energy at a millimeter wave frequency, and

(c) a processor including a CPU and a modem responsive to said CPU, said processor varying the ratio of the periods of transmission and reception of bursty data by said antenna as a function of signals provided by said hub processor.

56. The system of Claim 55 wherein said routing of bursty data received from the computer network at the hub to one or more of said plurality of sector antennas is determined as a function of the content of the received bursty data.

57. The system of Claim 55 wherein one of said processors monitors the utilization of the bandwidth by the system and wherein the ratio of the periods of transmission and reception of bursty data for each are varied as a function of the monitored bandwidth utilization.

58. The system of Claim 57 wherein bandwidth utilization is continuously monitored.

59. The system of Claim 58 wherein bandwidth utilization is statistically determined.

60. The system of Claim 55 wherein the ratio of the periods of transmission and reception is dynamically configurable.

61. The system of Claim 55 wherein said hub processor includes means for varying the data density of the data received from the node and supplied to the computer network to which connected as a function of information provided by the connected computer network.

62. The system of Claim 61 wherein the bursty data is transmitted in a plurality of frames where each of said frames includes a plurality of slots and each of said plurality of slots includes a plurality of cells, wherein the bursty data carried by certain ones of said cells includes header information and the bursty data carried by certain other ones of said cells includes payload information, wherein the data density of said payload cells is capable of being controlled independently from the data density of the header cells so that each of said plurality of nodes can receive data at a cell density independent of the cell data density of every other node, to thereby optimize the grade of service for each of said plurality of nodes and maximize throughput of the point-to-multipoint system.

63. A time division duplex, fixed frame, point-to-multipoint communications system with at least one hub each having at least one modem and plural directional antennas and a plurality of nodes each having a highly directional antenna, wherein:

the ratio of the forward and reverse portions of said frame is dynamically variable; and the data density within said frame is dynamically variable.

64. The system of Claim 63 wherein the assignment of said modems to selected ones of said plurality of antennas is dynamically variable.

65. The system of Claim 63 wherein the data density within the forward portion of said frame is independent of the data density in the reverse portion of said frame.

66. The system of Claim 63 wherein both the forward and reverse portions of said frame include a plurality of time slots; and wherein the data density of each time slot is independent of the data density in others of said time slots.

67. The system of Claim 63 including means for monitoring at least one parameter of the communication link between the hub and each node; and wherein the data density is dynamically variable as a function of at least one monitored parameter.

68. The system of Claim 67 wherein the parameter is selected from the group consisting of:

a signal error rate;

a signal to noise ratio;

a signal to interference ratio;

a signal power level; and

a signal propagation delay experienced in communication between said hub and one of said plurality of nodes.

69. The system of Claim 63 wherein the data density is variable as a function of the distance between said hub and said nodes.

70. The system of Claim 63 including means for monitoring the utilization of the bandwidth of the system by each of the nodes; and wherein the assignment of hub antennas is a function of the monitored bandwidth.

71. The system of Claim 70 wherein bandwidth utilization is continuously monitored.

72. The system of Claim 70 wherein bandwidth utilization is statistically determined.

73. An adaptive time division duplex point-to-multipoint communications system with at least one hub each having plural directional sector antennas and with a plurality of nodes each having a highly directional dish antenna wherein:

the frequency of the communication between said hub and said nodes is between about 10 GHz and about 60 GHz; the bandwidth of the communication between said hub and said nodes is at least 10 MHz; and the beam width of said hub antennas is wider than the beam width of said node antennas by a factor of at least eight.

74. The system of Claim 73 wherein the bandwidth of the communication between said hub and each of said nodes is about 50 MHz.

75. The system of Claim 73 wherein the frequency is about 38 GHz.

76. A communications hub in an adaptive time division duplex communications system comprising:

a first plurality of transceiver/directional antenna combinations for the transmission and reception of electromagnetic energy at a millimeter wave frequency, each of said combinations being oriented toward a sector substantially non-overlapping with the sectors to which the remaining combinations are oriented;

a modem selectively connected to said plurality of transceiver/directional antenna combinations; and a CPU operatively connected to said modem and to said transceiver/directional antenna combinations for selectively controlling the connection thereof, so that said CPU selects the transceiver/directional antenna combination and thus the geographic area to which electromagnetic energy is transmitted, and selects the data density of the data within the electromagnetic energy.

77. The system of Claim 76 including at least one transceiver/directional antenna combination oriented to substantially overlap one of the sectors to which one of said transceiver/directional antenna combinations is directed so that said CPU may also select the frequency of the electromagnetic energy transmitted into the overlapped sector.

78. The system of Claim 76 including means for monitoring the utilization of the bandwidth of the system; and wherein the assignment of said modems to one of said plurality of transceiver/directional antennas is a function of the monitored bandwidth.

79. A communications hub in an adaptive time division duplex communications system comprising:

first and second transceiver/directional antenna combinations for the transmission and reception of electromagnetic energy at different millimeter wave frequencies, said combinations having substantially overlapping beams;

a modem selectively connected to said first and second transceiver/directional antenna combinations; and

a CPU operatively connected to said modem and to said transceiver/directional antenna combinations for selectively controlling the connection thereof, so that said CPU selects the transceiver/directional antenna combination and thus the frequency of the electromagnetic energy transmitted into the overlapped sector, and selects the data density of the data within the electromagnetic energy.

80. The system of Claim 79 including means for monitoring the utilization of the bandwidth of the system; and

wherein the assignment of said modems to one of said plurality of transceiver/directional antennas is a function of the monitored bandwidth.

81. A modular, point-to-multipoint, millimeter wave, adaptive time division duplex communication system comprising:

an initial hub having an initial transceiver and modem and an initial directional antenna oriented toward a first predetermined area;

an initial node in said first predetermined area having an initial transceiver and modem and having an initial highly directional antenna oriented toward said initial hub;

at least one auxiliary node within said first predetermined area having a transceiver and modem and having a highly directional antenna oriented toward said hub, the addition of said auxiliary node to the system being a function of the traffic requirements of the system within said first predetermined area and the capacity of said initial node;

an auxiliary transceiver and directional antenna located at said initial hub oriented toward said first predetermined area; and

a control circuit located at said hub for selectively adding said auxiliary transceiver and directional antenna to the system for communication to one of the nodes within said predetermined geographic area as a function of the traffic requirements of the system within said predetermined geographic area.

82. A point-to-multipoint adaptive time division duplex communication system for the radio communication of bursty data from one computer network to another computer network comprising:

a plurality of hubs each geographically located in a predetermined location and adapted to be operatively connected to a computer network for the communication of bursty data between the hub and the computer network to which connected, said hub having:

(a) a plurality of transceivers for the transmission and reception of electromagnetic energy at a millimeter wave frequency,

(b) a plurality of directional sector antennas directionally oriented to a predetermined geographic area and adapted for the transmission and reception of electromagnetic energy at a millimeter wave frequency, and

(c) a processor including a CPU and a modem responsive to said CPU, said processor:

(i) determining the routing of the bursty data received from the computer network to which operatively connected to one or more of said plurality of sector antennas,

(ii) providing synchronization signals, and

(iii) formatting the received bursty data into time division duplex frames having a transmission portion and a receive portion, each of said portions having plural slots with an overhead portion and a payload portion, the data density of the bursty data within said payload portion being dynamically adjusted.

83. The system of Claim 82 wherein each of said hubs is adapted to be connected to a computer network through a node, each node being geographically spaced from said hubs and having:

(a) a transceiver for the transmission and reception of electromagnetic energy at a millimeter wave frequency,

(b) a highly directional antenna directionally oriented toward one of said hubs, said antenna being adapted for the transmission and reception of electromagnetic energy at a millimeter wave frequency, and

(c) a processor including a CPU and a modem responsive to said CPU, said processor varying the ratio of the portions of transmission and reception of bursty data by said node antenna as a function of signals provided by the processor at one of said hubs.

84. A point-to-multipoint adaptive time division duplex system for the short distance radio communication of bursty data from one computer network to another computer network comprising:

a hub geographically located in a predetermined location and adapted to be operatively connected to a computer network for the communication of bursty data between the hub and the computer network to which connected, each hub having:

(a) a plurality of transceivers and sector antennas for the transmission and reception of electromagnetic energy at a millimeter wave frequency, and

(b) a processor including a CPU and a plurality of modems responsive to said CPU, said processor:

(i) determining the routing of bursty data received from the computer network to one or more of said plurality of transceivers and sector antennas;

(ii) monitoring the utilization of the bandwidth of the system;

(iii) assigning said modems to one of said plurality of transceiver/sector antennas as a function of the monitored bandwidth, and

(iv) providing signals for synchronizing the periods of transmission and reception by any nodes communicating with said hub; and

a plurality of nodes each geographically spaced from said hub within said predetermined geographic area, each of said nodes being adapted to be operatively connected to a computer network other than the computer network to which one of said

hubs is adapted to be connected for the communication of bursty data between the node and the computer network to which connected, each of said plurality of nodes having:

(a) a transceiver and a highly directional antenna located within the geographic area directionally oriented toward one of said hubs for the transmission and reception of electromagnetic energy at a millimeter wave frequency,

(b) a processor including a CPU and a modem responsive to said CPU, said processor varying the ratio of the periods of transmission and reception of bursty data by said node antenna as a function of signals provided by the processor at one of said hubs.

85. The system of Claim 84 wherein said routing of bursty data received from the computer network at the hub to one or more of said plurality of sector antennas is determined as a function of the content of the received bursty data.

86. A hub for a point-to-multipoint adaptive time division duplex system for the short distance radio communication of bursty data from one computer network to another computer network comprising:

(a) a plurality of transceivers for the transmission and reception of electromagnetic energy at a millimeter wave frequency,

(b) a plurality of directional sector antennas directionally oriented to a predetermined geographic area and adapted for the transmission and reception of electromagnetic energy at a millimeter wave frequency, and

(c) a processor including a CPU and a modem responsive to said CPU, said processor adapted to be operatively connected to a computer network for the communication of bursty data between the processor and the computer network to which connected, said processor:

(i) formatting the communication received from the network by the assembly of a plurality of fixed duration frames having a portion for transmission and a portion for reception, each frame having at least one time slot in the transmission portion and in the reverse portion, each time slot having (1) an overhead portion and (2) a payload portion having one or more fixed duration data cells,

(ii) monitoring the utilization of the bandwidth by the system,

(iii) varying as a function of the monitored bandwidth utilization the number of cells in each slot to thereby vary the ratio of the portions of transmission and reception within each frame, and

(iv) providing signals for synchronizing the portions of transmission and reception by any node with whom radio communication is established.

87. The hub of Claim 86 wherein the number of cells in each slot is dynamically variable.

88. The hub of Claim 86 wherein the number of cells in each slot is statistically determined.

89. A point-to-multipoint adaptive time division duplex system for the short distance radio communication of bursty data from one computer network to another computer network comprising:

a plurality of hubs each geographically located in a predetermined location and adapted to be operatively connected to a computer network for the communication of bursty data between the hub and the computer network to which connected, each hub having:

(a) a plurality of transceivers for the transmission and reception of electromagnetic energy at a millimeter wave frequency,

(b) a plurality of directional sector antennas directionally oriented to a predetermined geographic area and adapted for the transmission and reception of electromagnetic energy at a millimeter wave frequency, and

(c) a processor including a CPU and a modem responsive to said CPU for determining the routing of bursty data received from the computer network to one or more of said plurality of sector antennas; and

a plurality of nodes each geographically spaced from all of said hubs, each of said nodes being adapted to be operatively connected to a computer network other than a computer network to which one of said hubs is adapted to be connected, and each of said nodes communicating with one of said hubs at a millimeter wave frequency, the processor at one of said hubs providing signals for synchronizing the periods of transmission and reception by all hubs with overlapping sector antennas.